



The Integrated Environmental Strategies (IES) Program in Mexico City, Mexico

What is the IES Program?

The IES program engages developing countries to help build support for integrated planning to reduce emissions of both global greenhouse gases (GHGs) and local air pollutants. The program promotes the analysis of and local support for implementation of policy measures resulting in multiple environmental, public health, and economic “co-benefits.” By analyzing and implementing “integrated” policies and measures, such as clean energy (e.g., renewable energy), energy efficiency (e.g., improved energy efficiency standards for appliances), and public transportation (e.g., converting diesel buses to compressed natural gas), IES partners have an opportunity to make a positive impact on local air quality, public health, and the economy, while at the same time reducing GHGs at the global level.

Objectives of the IES Program in Mexico

The National Institute of Ecology (INE)—the key Mexican governmental partner—began IES work in Mexico City, Mexico, in February 2002. The IES team designed the project to: 1) improve analysis of air pollution control measures under consideration in PROAIRE—the air quality management plan for the Mexico City Metropolitan Area (MCMA); and 2) add consideration of GHG emissions to this analysis.

The IES team in Mexico City initially divided the project into three phases between 2002 and 2005, all focusing on MCMA. In Phase 1, the team analyzed opportunities for simultaneously reducing emissions of local air pollutants and GHGs more cost-effectively through the implementation of integrated

measures. During this analysis, the team collected and analyzed data on the costs and emission reductions associated with air quality control measures included in PROAIRE and GHG mitigation measures from separate studies. The team then identified least-cost strategies for meeting “co-control” targets for multiple emissions.

During Phase 2 of the project, the team analyzed five promising integrated measures included in PROAIRE covering the transportation, industrial, and residential sectors: 1) taxi fleet renovation; 2) metro expansion; 3) introduction of hybrid buses; 4) industrial cogeneration; and 5) reductions of liquid petroleum gas (LPG) leaks from residential cooking and water heating devices. The analysis considered the effects of these five measures on emissions of local air pollutants and GHGs (see Figure 1). The team also estimated the economic health benefits related to implementation of these integrated measures.

Phase 3 of the project examined the local and global benefits of implementing a Bus Rapid Transit (BRT) system in Mexico City, which serves 250,000 passengers daily on a 12-mile route through the city. The team quantified four co-benefits of the BRT system: 1) reduced emissions of local air pollutants; 2) resulting human health impacts; 3) reduced GHG emissions; and 4) reduced travel time.

A fourth phase, which will cover the entire country, is currently beginning and will be finished in 2007. Phase 4 will estimate the impacts of national emission control measures on air quality and associated reductions in GHG emissions. During this final phase, the team will use a three dimensional air

Figure 1. Mitigation Measures Analyzed

Mitigation Measure	CO ₂ Emission Reductions (tons/year)
Taxi Fleet Renovation: Replace 80% of old taxis by 2010	257,542
Metro Expansion: Complete 76 kilometers of new metro construction by 2050	160,368
Hybrid Buses: Replace 1,029 old diesel buses with hybrid buses by 2006	60,656
LPG Leaks: Perform stove maintenance in one million households to eliminate leaks	5,888
Cogeneration: Install 160 megawatts of new cogeneration capacity by 2010	856,081

This figure describes a sample of mitigation measures analyzed and their associated CO₂ emission reductions.



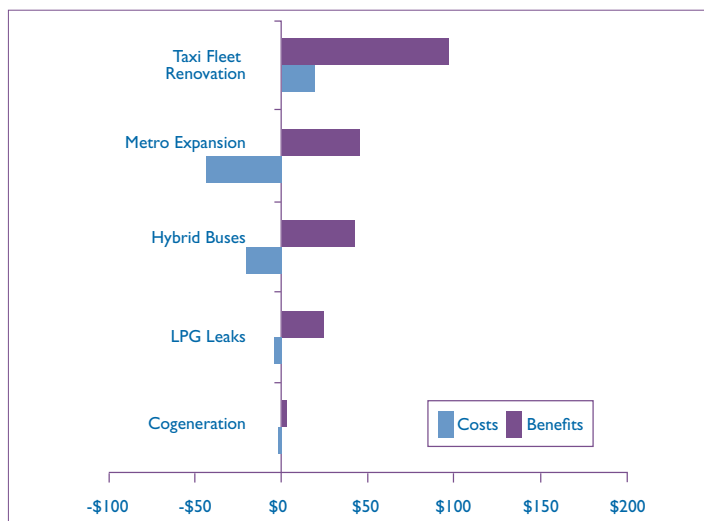
quality model, in combination with the Environmental Benefits Mapping and Analysis Program (BenMAP), to also assess the resulting health impacts at the national level.

Project Results

The results of Phase 1 indicated that implementation of the measures in PROAIRE would yield a reduction of about 2.2 million tons of carbon dioxide (CO₂) emissions per year in 2010. Investments to improve the transportation infrastructure (e.g., expansion and improvement of public transportation) and measures that improve vehicle technology and replace old vehicles contribute equally to these emission reductions.

Results also indicated a significant opportunity for achieving the air quality goals of PROAIRE at a reduced cost. The total cost of achieving air quality improvements could be reduced by focusing on more cost-effective measures, such as taxi fleet renovation (see Figure 2). The GHG mitigation measures were often characterized by relatively large up-front investments, but showed good returns over the long term, due to significant savings in fuel or electricity consumption.

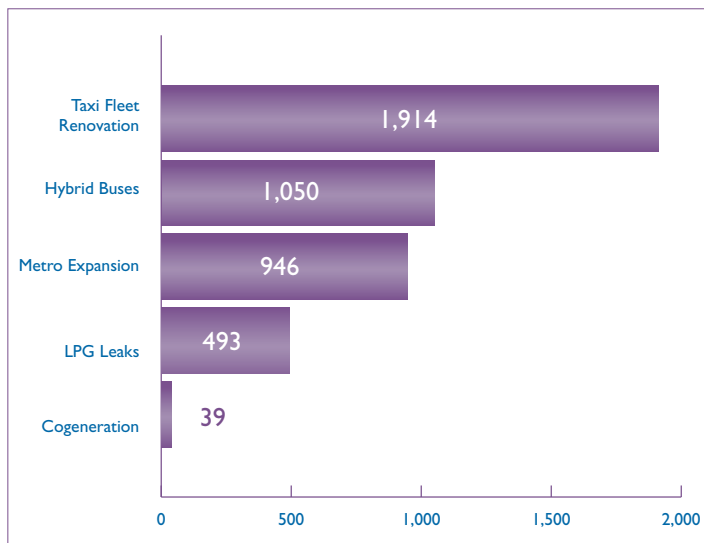
Figure 2: Costs and Economic Health Benefits, 2003-2020
(million US\$/year)



This figure illustrates the costs of and resulting economic health benefits for the five analyzed mitigation measures. Note that negative costs indicate a net cost and positive costs indicate a net savings.

In Phase 2, the Mexico team found that the five mitigation measures analyzed could reduce ambient particulate matter concentrations by one percent, maximum daily ozone concentrations by three percent, and also reduce GHG emissions by two

Figure 3: Quality-adjusted Life Years Saved Annually, 2003-2020



This figure illustrates the estimated number of quality-adjusted life years saved annually over the period 2003 to 2020 resulting from the implementation of five mitigation measures.

percent (more than one million tons of CO₂ per year). The team also estimated that these five mitigation measures could collectively save more than 4,400 quality-adjusted life years annually (see Figure 3), with associated economic health benefits on the order of 200 million \$US per year (see Figure 2). In contrast, the team estimated total costs to be less than 70 million \$US per year.

In Phase 3, the BRT project results showed that reduced emissions of local air pollutants could result in economic health benefits of approximately 3 million \$US each year, while eliminating 280,000 tons of CO₂-equivalent emissions over a 10-year period.

Other Outcomes of the Program

Experience to date in attracting interest from policymakers has been very encouraging. Project meetings and discussions of the assumptions used during analysis involve a wide participation from the metropolitan environmental commission, and have raised awareness of possible methodological improvements. Results of each phase of the program have been presented to key stakeholders and have been published in technical reports as well as peer-reviewed articles.

For More Information

Visit the IES Web site at www.epa.gov/ies. You may also e-mail ies@epa.gov.

